

Ground Control Report

Vilas County LiDAR mission, May 2013

1.1 Ground Control Design

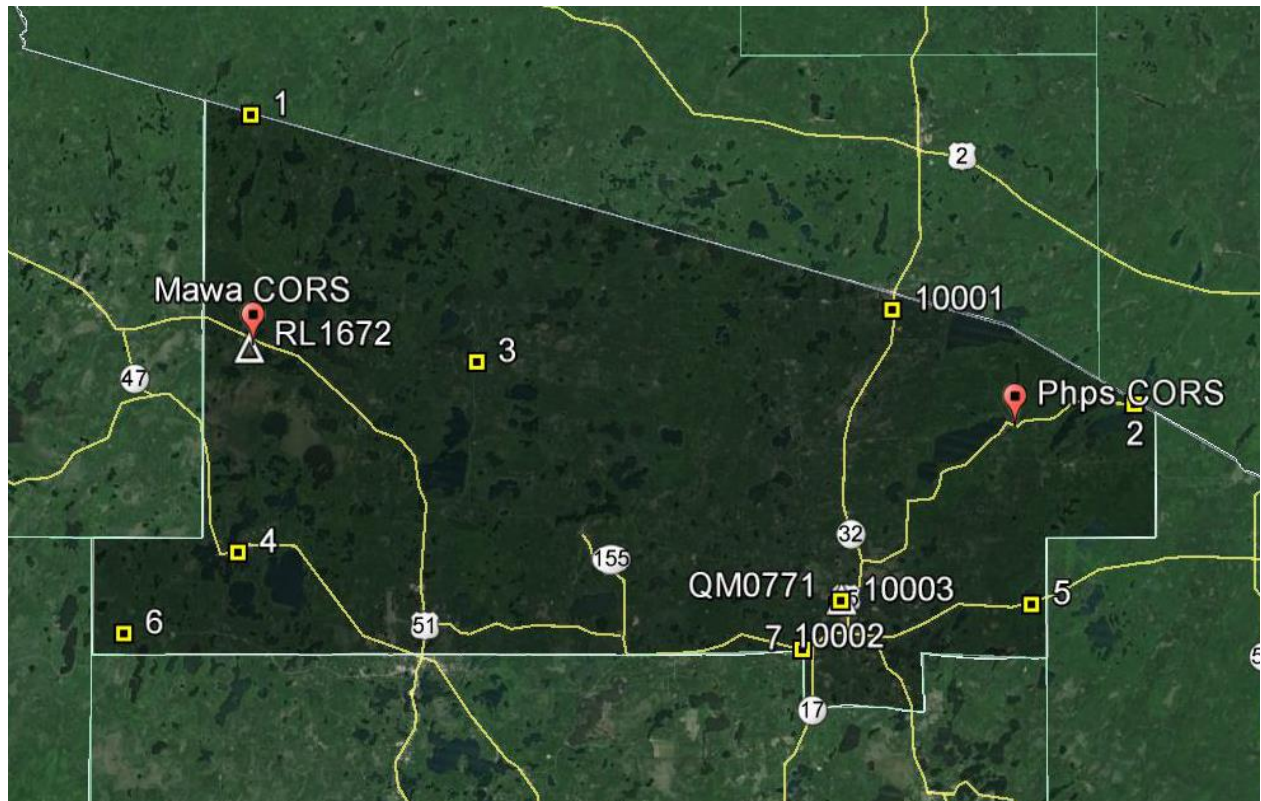
The ground control network and design used for the Vilas County LiDAR project was made up of index points, GPS base stations, NGS monuments, and check points from the vertical accuracy ground control survey. This report will focus on the index points that were collected at 10 locations in and around Vilas County. The index points are used for QC checks and calibration of the raw point cloud and for additional vertical checks against the processed bare earth surface. The GPS base station information that was used for this project is outline in the report called 'ABGPS Processing Report'. The checkpoints that were collected for the independent vertical accuracy ground truth report are reported in the 'FEMA Accuracy Report'.

The ground control index survey was done in Wisconsin County Coordinate Reference System (WISCRS) – Vilas County, NAD83 (2011), NAVD88 (Geoid 12A), US Survey Feet. The index survey was conducted by Ayres Associates surveyors in May 2013.

1.1.2 Vilas County Index Point Layout

The locations were selected near the four corners of the county, along with three points in the interior of the county. This layout design is preferred when the index points will be used to check different areas across a large flight block. The index point survey was conducted with a Trimble R-10 receiver using a WISCRS connection via Verizon wireless.

1.1.2.1 Map of index points and GPS base stations



1.1.2.2 Vilas Co LiDAR index points

Point ID	X	Y	Z
1	342480.509	242862.168	1671.639
2	577040.314	166419.443	1713.119
3	402528.924	177513.247	1654.969
4	339144.567	127160.700	1608.751
5	549690.238	113497.167	1718.544
6	308813.706	105699.526	1596.830
7	488900.384	101604.685	1635.083
10001	512690.084	191366.824	1703.823
10002	498373.909	112914.467	1637.949
10003	499084.190	114467.864	1638.420

1.1.3 Field Notes and Photos of Index Points (following pages)

INCH



Name _____

Address _____

Phone _____

Project _____

Clear Vinyl Protective Slipcovers (Item No. 30) are available for this style of notebook. Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

CONTENTS

PAGE	REFERENCE	DATE
2-4	BASE SETUPS	
8-9	INDEX POINTS W/ DESCRIPTIONS SEE KML FILE 1-6	
10-12	FEMA MAPPING AREAS FOR GROUND TRUTHING 100-601, 1000-6191	
	COORDINATES ARE P, N, E, Z, C FORMAT WCCS WISCORS 74.58 GNSS MODEL-3 75.52 TRIMBLE 5-6	
	POINT # 10001, SHOT ON LANDPORT GPS # 10000, SHOT ON QMOBII # 10002, SHOT ON ER AZ MK # 10003, SHOT ON ER GPS	

5-13-13

EAGLE RIVER AZI MARK

Receiver GX1210 S# 464398

#74.87 ANT. AX1202GG S# 06380076

1.8 M TO ARP

6:05 AM - 7:25 PM

5-13-13

EAGLE RIVER GPS

Receiver GX1230 S# 464803

74.95 ANT. AX1202GG S# 06440109

1.8 M TO ARP

6:22 AM - 7:31 PM

5-13-13

HILES

74.88 RECEIVER GX1230 S# 464602

ANT. AX1202GG S# 06380040

1.8 M TO ARP

7:07 AM - 6:40 PM

5-14-13

EAGLE RIVER AZI MARK (1)

#74.95 Receiver GX1230 S# 464803

100% Point
Occupation ANT. AX1202GG S# 06440109

1.8 M TO ARP

6:06 AM - 7:13 PM

5-14-13

#74.87 EAGLE RIVER GPS (2)

RECEIVER GX1210 S# 464398

ANT. AX1202GG S# 06380076

1.8 M TO ARP

6:17 AM - 7:17 PM

5-14-13

(3)

#74.88

HILES

100% Point
Occupation

RECEIVER GX1230 S# 464602

ANT. AX1202GG S# 06380040

1.8 M TO ARP

6:58 AM - 6:15 PM

5-15-13

#7487

#7485

0001

EAGLE RIVER AZ MARK 001

1.8 M TO ARP

~~6:07~~ 6:20 AM - 12:20 AM

RELIEVER GX1310 464398

ANTENNA AX120266 06380076

74.95

GPS EAGLE RIVER GPS

1.8 M TO ARP

6:30 AM - 12:27 AM 5-16-13

RELIEVER GX1230 464803

ANTENNA AX120266 06440109

HILES

1.8 M TO ARP

7:10 AM - 10:18 PM

RELIEVER GX1230 464602

ANTENNA AX120266 06380040

7488

- 7- INDEX 7, SET PK NAIL IN CENTER OF END OF WHITE STRIPE, SW QUAD OF STH 70 & CTH H, SHOT AS POINT #7. TOOK 2 PICS 1 N / 2 E BLACKTOP SURFACE
- 5- INDEX 5, SET PK NAIL IN CENTER OF END OF WHITE STRIPE, NE QUAD OF STH 70 & S. ANVIL LAKE RD AS POINT #5 TOOK 2 PICS 1 W / 2 N BLACKTOP SURFACE
- 2- INDEX 2, SET PK NAIL IN CENTER OF END OF WHITE STRIPE (WEST END) IN BETWEEN ENTRANCES TO SMOKEY LAKE BOAT LANDING PARKING LOT. SHOT AS #2, TOOK 2 PICS 1 W / 2 N BLACKTOP SURFACE
- 1- INDEX 1 SET PK IN CENTER OF END OF WHITE STRIPE, NW QUAD OF ~~CTH~~ CTH O & OLD HWY O, 100' S OF WISCONSIN MICHIGAN STATE LINE, TOOK 2 PICS 1 W / 2 S BLACKTOP SURFACE

- 3- INDEX 3 SET PK IN ~~CTH~~ ^{MAIN} CTH K & CTH M, 2 PICS 1 NE / 2 W
- 4- INDEX 4 SET PK IN END OF LT TURN ARROW & LITTLE PINES RD & STH 47, TO TURN ONTO LITTLE PINES RD @ CASINO LT TURN OFF OF EB STH 47. PIC 1 E / PIC 2 SE BLACKTOP SURFACE
- 6- INDEX 6 SET PK IN CENTER OF END OF WHITE STRIPE SW QUAD OF HWY 70 & W. SQUAW LAKE RD. 1 PIC NW / 2 PIC SE BLACKTOP SURFACE



Index Point 1



Vilas Co.

VILAS COUNTY IS ZONED
BUILDING PERMITS
REQUIRED
TOWN OF WINDSOR
BUILDING PERMITS
REQUIRED

OLD HWY 0

Index Point 1





Index Point 2



Index Point 2

NESS ART GALLERY

Firehouse
Pottery & Gallery

COUNTY
K
COUNTY
M
←

PARK ST
MAIN ST

SAUTER
BUILDERS
715-385-9327
www.sauterbld.com

WINTER
PARK →

Index Point 3





Index Point 3





Index Point 4



Index Point 4



Nat'l Forest
Campground
→
Anvil Lake

Index Point 5



Index Point 5



Index Point 6





Index Point 6



Index Point 7

5406



Index Point 7

70
↔

EAST
70

COUNTY
H

→

STOP

70

1.1.4 Vilas County LiDAR, index point statistics

The final step in using the index points is to run a statistical comparison against the bare earth ground surface to confirm that the vertical accuracy is within specification. The following results indicate that the overall RMSEz of the index points is .196'. This is a separate check as compared to the FEMA Accuracy Report. The index points are used in the calibration of the raw point cloud, and therefore are not an independent set of checkpoints like those used in the FEMA reporting.

The following page shows the statistical report for the index points. Note that point 1000 does not report a 'surface Z' and therefore no 'Delta Z'. This is because the point falls outside the Vilas Co LiDAR buffer and do not have LiDAR coverage. The 'control Z' values were collected using the Trimble receiver and were used in the LiDAR block calibration.

1.1.4.1 Statistical Report for index points

```
Control Point Report (LP360, QCoherent Software, LLC)
Generated by mv322 (07/13/15 15:01:41)

----- Report Disclaimer -----

This report does not guarantee accuracy. The report
only reflects one statistical representation of the
control points, LIDAR data and surface used. This report
does not replace a thorough quality control process.

----- Report Summary -----

Vertical Error Mean:          -0.032
Vertical Error Range:        [-0.497,0.264]
Vertical Skew **:             -0.939
Vertical RMSE:                0.196
Vertical NMAS/VMAS Accuracy (90% CI): ±0.323
Vertical ASPRS/NSSDA Accuracy (95% CI): ±0.385
Vertical Accuracy class:     0.20
Vertical Min Contour Interval: 0.60

Point Counts
Horizontal Measured: 0
Vertical Measured: 10
withheld: 0 of 11

----- End Report Summary -----

----- Surface Definition -----

Surface Method: Triangulation (TIN)

Classification Filter Used:
  -ALL classification values used in filter

Return Combination Filter Used:
  -ALL return combinations used in filter

----- End Surface Definition -----

----- Control Points -----

Name  Description Type Control X Control Y Control Z Surface Z Z Location Delta Z
1     CP           342480.509 242862.168 1671.639 1671.633 Control 0.006 CP
2     CP           577040.314 166419.443 1713.119 1713.045 Control 0.074 CP
3     CP           402528.924 177513.247 1654.969 1654.705 Control 0.264 CP
4     CP           339144.567 127160.700 1608.751 1608.632 Control 0.119 CP
5     CP           549690.238 113497.167 1718.544 1718.508 Control 0.036 CP
6     CP           308813.706 105699.526 1596.830 1596.921 Control -0.091 CP
7     CP           488900.384 101604.685 1635.083 1635.039 Control 0.044 CP
10000 CP           566898.687 28751.606 1674.942 No-Data --- CP
10001 CP           512690.084 191366.824 1703.823 1703.966 Control -0.143 CP
10002 CP           498373.909 112914.467 1637.949 1638.080 Control -0.131 CP
10003 CP           499084.190 114467.864 1638.420 1638.917 Control -0.497 CP

----- End Control Points -----
```